

**U.S. Army Corps  
of Engineers  
Pittsburgh District**

# **YOUGHIOGHENY LAKE WATER MANAGEMENT AND REALLOCATION STUDY**

## **DRAFT FEASIBILITY REPORT**

### **YOUGHIOGHENY RIVER LAKE OPERATIONS APPENDIX**

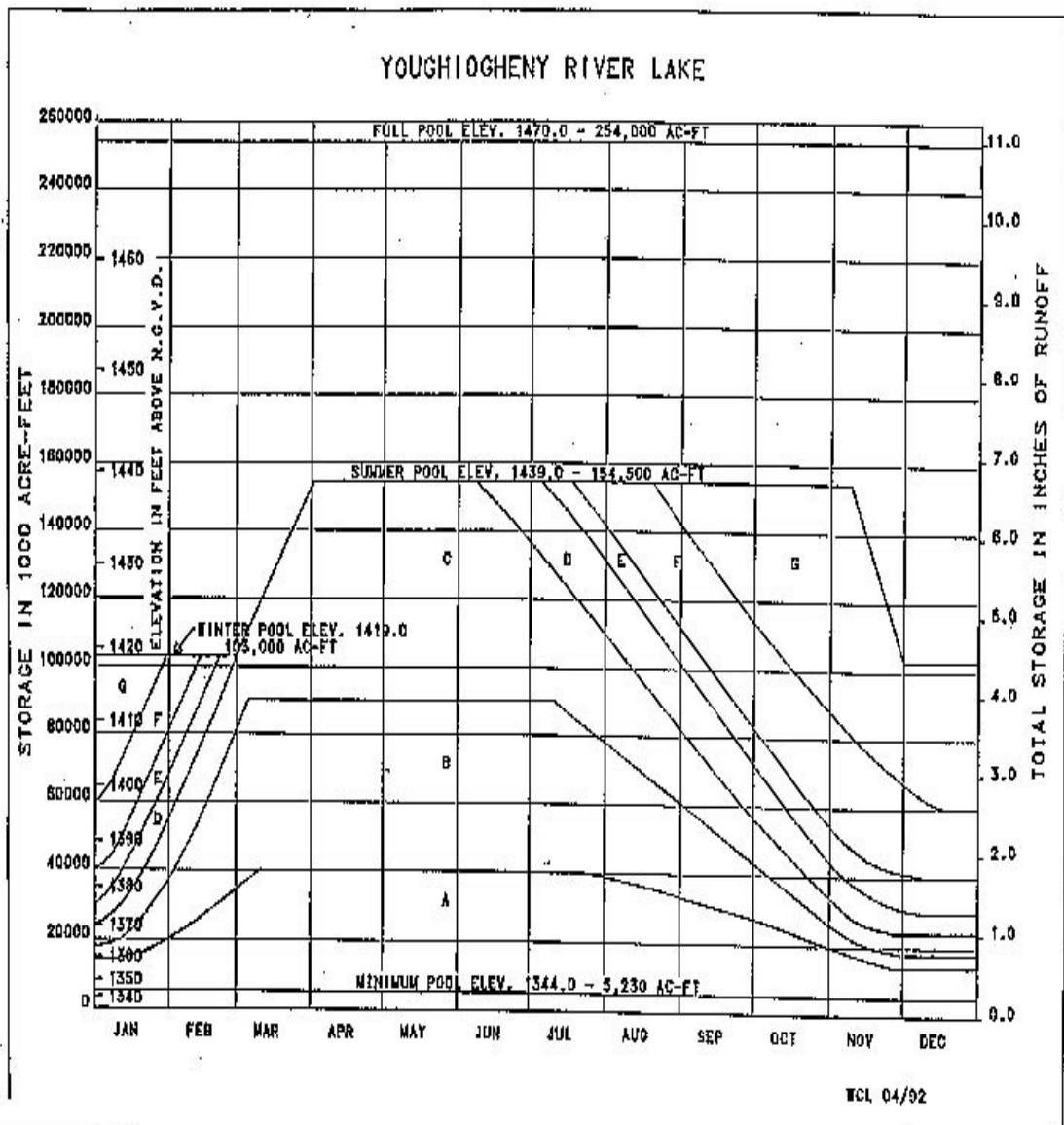
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## 1. RESERVOIR OPERATIONS

The Youghiogheny River Lake operations are dictated by an approved storage and release schedule designed to meet the primary project purposes of flood control, low flow augmentation for water quality, and recreation. The current flood control schedule was developed in 1940 after a study of the floods during the period of record and the theoretical floods that could occur during the life of the project. The regulation of the lake for low flow augmentation is based on the stream's natural flow at Connellsville, PA and available reservoir storage conditions. Figure 1 and Table 1 depict the salient aspects of the project operations.

Figure 1. Youghiogheny River Lake Guide Curves



**Table 1 Current Youghiogheny River Lake Storage and Release Schedule**

Uncontrolled Flow at Connellsville in cfs	Outflow from Dam in Cubic Feet per Second						
	ZONE						
	A	B	C	D	E	F	G
0-100	200	300	400	600	900	1200	1500
100-300	150	250	350	550	800	1100	1500
300-500	100	200	300	500	700	1000	1500
500-1000	100	100	200	400	600	900	1500
1000-Zone Limit	1000	1000	1300	1500	1700	2000	3000
> Zone Limit	100	100	100	100	100	100	500

The reservoir has a minimum pool (permanent storage) of 5,200 acre-feet (1,344'), a low flow regulation (summer pool) of 154,500 acre-feet (1,439'), a winter pool of 103,000 acre-feet (1419'), and full pool capacity of 254,000 acre-feet (1,470'). Full pool would only be reached during an extended period of extreme flooding. During the entire time the project has operated, full pool has never been reached. The record pool elevation on the Youghiogheny River Lake is 1460.95' in April 1993. At that elevation, the pool was still approximately 9' below full pool.

The difference between the winter pool and the summer pool (1419'/103,000 acre-ft and 1,439'/154,500 acre-ft, respectively) reflects the annual filling and draw down cycles of the reservoir operations. The typical filling rate for the reservoir was determined based on precipitation for the three-month period preceding May 1. Since the months of February, March and April are normally high runoff months, it was assumed that practically all of the flow from the reservoir tributary area would be available for storage retention during these months. Therefore, if the reservoir were at winter pool (1419') by mid-February, the reservoir should be filled to summer pool (1439'-1441') by May 1 practically every year.

During the spring, water accumulates in the reservoir raising the surface elevation by approximately 20' (1,419 to 1,439) and adding an additional 51,500 acre-feet (103,000 to 154,500) to the volume of water held in the Youghiogheny River Lake.

Summer drawdown occurs between June and November, depending on runoff and downstream requirements. By the end of November, the pool is scheduled to be drawn down to at least elevation 1419' to provide a minimum flood control storage reserve of 151,000 acre-feet. Typically, the winter pool (1419') is reached by the end of November (USACE, 1981).

During the period from December through February, the reservoir pool should not exceed the elevation of 1419' except during flood storage periods. Below elevation 1419', excess flood flow is stored and released as conditions warrant. After February, reservoir operations dictate the re-filling cycle again be repeated as described above.

**Table 2 Youghiogheny River Lake Storage**

	Permanent Storage	Winter Pool	Summer Pool	Full Pool
Surface Elevation	1,344'	1,419'	1,439'	1,470'
Water Volume (acre-feet)	5,200	103,000	154,500	254,000
Surface Area (acres)	450	2,300	2,840	3,566
Flood Control Storage Available (acre-feet)	249,800	151,000	99,500	0

Reservoir guide curves that define unique operational characteristics of the dam were developed as part of the project's authorized operational schedule. The storage above minimum pool (elevation 1344.0 feet) is divided into seven zones, Zones A through Zone G. Pool elevation is plotted daily on the guide curves. This determines the release zone, Zone A through Zone G. The uncontrolled flow at Connellsville (Connellsville's flow less the Youghiogheny Lake's outflow) is then computed and, utilizing the zone determined from the guide curves, the release schedule determines the dam's release. These zones determine the release rate from the project. These guide curves and zone delineations were not changed as part of this study. The current release schedule has been utilized since the project went into operation. It was designed to provide low flow augmentation for water quality, and to force an early drawdown of the summer pool during a wet year. The current schedule was modeled as the "no change" alternative.

## **2. DROUGHT CONTINGENCY PLAN**

In 1990, the Pittsburgh District prepared a Drought Contingency Plan (DCP) for the Youghiogheny River Lake Basin. Revised in 1992, the DCP's primary value is in identifying drought conditions, documenting data needed in decisions, and defining the coordination needed to manage the basin's water resources to ensure that they are used in a manner consistent with the needs that develop.

The District has established three drought-action levels in response to a worsening drought situation. These levels correspond to the stages, which are declared by the Commonwealth of Pennsylvania for the portion of the Youghiogheny River Basin located in Pennsylvania and by the State of Maryland for the portion of the basin in Maryland. The three stages (levels) are: drought watch, drought warning, and drought emergency.

The Pittsburgh District, in recognition of the potential water needs that might develop during severe droughts, has developed a strategy for necessary actions and coordination needed to meet these potentialities.

Storage levels in the Youghiogheny River Lake are used as the primary drought stage indicator for regulation purposes. As uncontrolled stream flow diminishes, water is released from the lake to augment flow according to the storage and release schedule. As routine releases continue and compensatory inflow does not occur because of drought conditions, the lake levels drop. The Corps has established tabular information correlating the time of year and pool level in the lake to determine what drought action level (watch, warning, or emergency) is appropriate (USACE, 1992).

The Commonwealth of Pennsylvania and State of Maryland both require all water purveyors to develop and annually update a drought contingency plan. These plans set forth the procedures for conservation of water and other measures according to the drought action level that has been declared (USACE, 1992).

During a drought, and to the extent possible during periods of low precipitation which may lead to persistent drought conditions, all levels of water users and water resource managers (including the Corps) will be taking actions to conserve vital water resources. In addition, as meteorological conditions worsen during a prolonged period of drought the Youghiogheny River Lake releases will be as directed under the DCP, not necessarily according to the storage and release schedule. Water purveyors purchasing storage in the Youghiogheny River Lake as part of the proposed action understand that they only purchase storage and that the storage may or may not have water in it depending on the hydrological conditions. There is no guarantee of a specific yield to the water purveyors associated with this proposed action and their water withdrawal permits reflect that they must operate according to their own drought contingency plans during such an event.